

FAQ

Q How do the eSATA connectors, sockets and cables differ from those used by standard internal SATA?

A The eSATA cable connector and port have been significantly redesigned. To make the cables easier to insert and remove, and to stop you using normal SATA cables externally, the connectors are no longer L-shaped. There are springs on the top and bottom of the connectors to help hold them in place. In addition, to prevent electrostatic discharge travelling down the eSATA cable to the external drive, or from the PC's eSATA port to the motherboard, the contacts in both the connector and the socket have been moved further back out of harm's way.

The connectors are far more durable than the slightly flimsy SATA ones. While internal SATA connectors are rated to be inserted and removed just 50 times, eSATA connectors are designed to be safely inserted and removed up to 5,000 times. Finally, to meet emissions regulations, the eSATA cable has an extra layer of shielding.

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Build an eSATA external hard disk

Tired of your slow USB hard disk? Chris Finnamore shows you how to convert an external hard disk to eSATA for lightning-fast transfer speeds

External USB or FireWire hard disks are an extremely easy, not to mention portable, way to expand your PC's storage. Unfortunately, they are slower than internal disks. eSATA is a much faster way of connecting external storage to your PC. This month, we'll show you how to convert an external enclosure with a 3½in hard disk into a super-fast eSATA drive.

eSATA is really just a new connector for SATA and SATA2. Using it means that external storage can run as fast outside your PC's case as it does inside. As a quick example, the SATA interface has a transfer rate of 150MB/s and SATA2's rate is 300MB/s. USB Hi-Speed runs at 57.22MB/s and FireWire at 47.68MB/s. While these are interface speeds, not hard disk-sustained transfer rates, the slower speeds of USB and FireWire still have an impact on hard disk performance. To make matters worse, an external USB or FireWire drive is actually an enclosure that contains an IDE or SATA hard disk. A bridge chip then translates the drive's protocol into USB or FireWire, which causes an overhead that further reduces transfer rates.

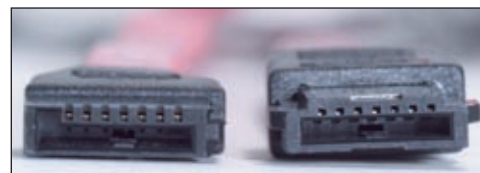
The fact that these enclosures contain a normal hard disk means that all we need to do is bypass the enclosure's bridge chip and run eSATA directly to the hard disk. As eSATA uses the same protocol as your PC's SATA ports, there's no translation and no overhead. The only difference between the two standards is that eSATA connectors, ports and cables are a slightly different design that can withstand being unplugged more frequently. See the FAQ (left) for details.

Converting an external hard disk enclosure with a SATA hard disk is the easiest job, as you just need a

simple adaptor. Converting an IDE disk is a little trickier, as you also need to buy an IDE-to-SATA adaptor. Our shopping list opposite has a list of all the parts you'll need for SATA and IDE disks. It assumes you don't have an eSATA port and have a free internal SATA port. Take off the side of your PC and check. If you don't have any free SATA ports, you can buy a PCI-E eSATA card for £26 including VAT (www.scan.co.uk) or a PCI eSATA card for £27 including VAT (www.macheaven.co.uk) instead of the eSATA-ECP-1-45 on our shopping list.

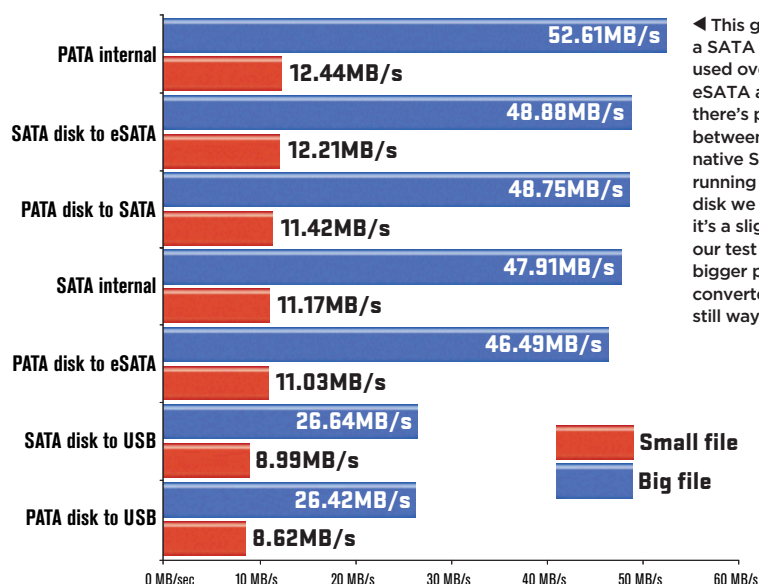
Our instructions cover adapting an external 3½in hard disk, as the larger enclosure size gives us more room to work and fit the necessary eSATA port. You could apply these instructions to a 2½in or 1.8in hard disk, but you'll find it fiddly to do and you'll need different interface adaptors and an enclosure with external power, as eSATA doesn't carry its own. You'll also see less of a performance increase, as notebook hard disks are quite slow.

Our instructions apply equally to ready-built external hard disks and self-build enclosures. If you're planning to build an external drive from scratch,



▲ On the left is a standard SATA connector, and on the right is an eSATA plug. The SATA connector has an L-shaped plug

Performance comparisons



◀ This graph shows the speeds of a SATA disk and PATA disk when used over their native interface, eSATA and USB. As you can see, there's practically no difference between a SATA disk running native SATA and the same disk running over eSATA. The PATA disk we used topped the table, as it's a slightly quicker drive than our test SATA disk, but it takes a bigger performance drop when converted to eSATA, although it's still way ahead of USB.

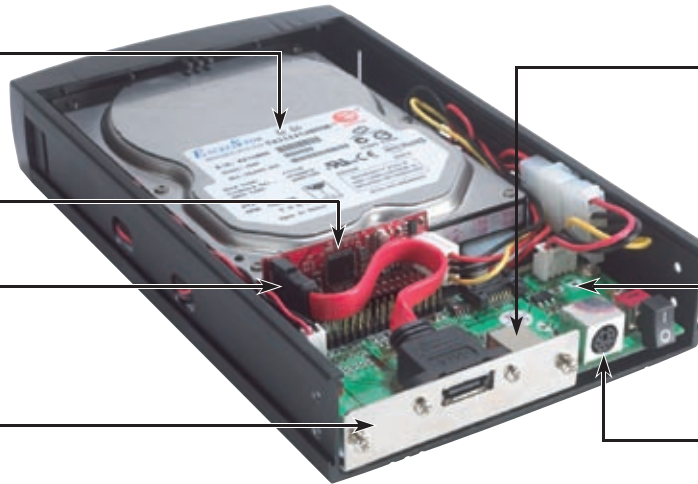
INSIDE YOUR ESATA DRIVE

HARD DISK You can use either a SATA or PATA hard disk in your eSATA enclosure

IDE-TO-SATA ADAPTOR This converts a PATA interface to SATA. You'll need this if you're using a PATA disk, but not if you're using a SATA disk

STANDARD SATA CONNECTOR This plugs straight into your disk's SATA port. The other end has an eSATA port on it

ESATA BACKPLATE This provides an eSATA port and comes with an integrated SATA cable to plug into your hard disk



ORIGINAL USB PORT The external disk's USB port is no longer needed, so you can block it with the eSATA backplate

ORIGINAL HARD DISK ENCLOSURE CIRCUIT BOARD The original circuit board has to stay in the hard disk enclosure to provide power to the drive

POWER CONNECTOR The eSATA cable transfers only data and not power, so you'll still need to plug in your enclosure

though, you should buy an enclosure with eSATA built in. You can get one for around £22 from www.scan.co.uk. If you plan to use this new enclosure with a PATA disk, you'll also need to buy the SATA-to-IDE adaptor on our shopping list.

As well as the kit on the shopping list, you may need tools to trim the metal backplate and cut a hole in the rear of the external drive enclosure. We used a hacksaw to cut the metal backplate and a Dremel Multi-Tool's miniature circular saw attachment to cut an opening in the back of our drive enclosure. You'll also need some glue that can bond metal, such as Superglue or Araldite.

GETTING STARTED

First, check that the SATA port you're going to use is enabled and not configured for RAID. Start your PC and go into the BIOS. The SATA and RAID options should be on the Integrated Peripherals screen, but as there are many different types of BIOS you may have to consult your motherboard's manual to find them. Make sure the SATA port is on and in standard SATA and not RAID mode. While you're in the BIOS, find the list of hard disks currently attached to your PC (usually in the Standard Settings section) and note down the name of your current hard disk or disks. This will help you to tell your eSATA disk from your internal system disk.



The eSATA backplate fits in a spare slot in your case

Power off your PC and remove the side. To fit the eSATA backplate to your PC, you'll need a spare expansion slot in your case to screw in the blanking plate with the eSATA port. Try and use a slot you won't want to use for an expansion card, to avoid having to relocate the port at a later date. Plug the cable into the SATA port you checked above, and your PC now has an eSATA port.

Fitting the eSATA backplate to the external hard disk is a bit harder. The procedure depends on how your external hard disk's enclosure is constructed. Find and remove any screws holding the enclosures together and remove the cover. The hard disk will also be held in place with screws, so remove these as well, then unplug the power and data connectors from the rear of the disk.

The power and data connectors on the back of SATA disks are easy to remove, but IDE connectors should be treated with care. Try not to wobble the connector too much to avoid bending the pins. Remove the enclosure's circuit board, which has the USB or FireWire ports connected. This board also supplies power, so you'll need to replace it later.

TOOL TIME

You now need to make a hole for the backplate. Where you put this will depend on the design of your external disk enclosure, but you need to make a hole only wide enough for the eSATA port mounted on the external box blanking plate. Work out where you want the hole, then put the backplate against the rear of the enclosure from the inside to see if there's room. If the backplate obscures any ports, cut it to size with a hacksaw so it fits neatly. Mark out where you want the eSATA port with a ruler and knife, and cut the hole with your Dremel circular saw. Clean up the hole with sandpaper and glue the backplate in place. Replace the circuit board.

If you're using a SATA hard disk, you can now plug the eSATA backplate's SATA cable into your disk, reattach the power cable and screw the drive into place. If you're using an IDE hard disk, you'll need to fit the IDE-to-SATA adaptor. For the adaptor to work, the hard disk needs to be set as the master disk by adjusting the jumpers on the rear. Jumper positions should be printed on top of the disk.

Plug the adaptor's IDE connector carefully into the back of the disk. The adaptor's circuitry

SHOPPING LIST

(All prices include VAT)

SATA parts

(www.span.com)

eSATA-ECS-1 for external box (IRSA-SE1)	£4.58
eSATA-ECP-1-45 for PC (IRSA-PE1)	£2.82
Two-metre eSATA cable (IRSEE-200)	£5.05
Delivery	£4.70

TOTAL £17.16

IDE parts

(www.mhpcouterservices.com)

SATA-to-IDE adaptor	£9.95
Delivery	£2.41
TOTAL	£12.36

is powered by the hard disk's four-pin Molex power connector and it comes with a Molex pass-through cable. Plug the external enclosure's Molex power connector into the female Molex connector on the pass-through cable and plug the pass-through cable's male connector into the hard disk. Finally, plug the eSATA backplate's SATA cable into the SATA port on the back of the adaptor. Screw your hard disk back into place.

POWER UP

Put the cover back on your external enclosure. Plug the eSATA cable into the external enclosure's backplate and your PC's backplate. Plug your external enclosure's power in and turn it on. Power your PC on and go into your BIOS to check that the new disk is recognised. If it isn't, go back and check all the connectors.

Windows should detect your hard disk automatically and you'll be able to access any files you stored on it when it was a USB or FireWire disk. Technically you can hotswap eSATA disks in a similar way to USB or FireWire, but the process is a little trickier and Windows often has to be convinced to find a disk. For this reason, we'd recommend playing safe and shutting down your PC before connecting or removing any eSATA drives.

Next month

PC FIXING TIPS

Got a broken component? Our top tips will show you how to repair it